

### 9.3 NOTES

Not all samples can be used to make Confidence Intervals and to do Tests of Significance.

We need to check 3 conditions before we can run a test or create an interval.

#### 1) SRS (Simple Random Sample)

Why? Need to check to see the sample is not biased

#### 2) $n \geq 30$

Why? Need to check to see that the sample is large enough

#### 3) $pop \geq 10n$

Why? Need to check to see that the sample is small enough (not a bad census)

When checking conditions, you need to do 2 parts...

#### STATE

##### 1) SRS

##### 2) $n \geq 30$

##### 3) $population \geq 10 \cdot n$

#### CHECK

##### 1) Stated SRS in problem OR

Assumed sample is representative of pop.

##### 2) $n = \underline{100} \geq 30$

$n = 20$

##### 3) There are more than $10 \cdot n$ things.

Once these conditions are met, we can do a confidence interval or a test of significance.

If ANY of the conditions do not check out, then ... don't do problem

### Example #1

Many people have trouble setting up all the features of their cell phones, so a company has developed what it hopes will be easier instructions. The goal is to have at least 96% of customers succeed. The company tests the new system on 200 people, of whom 188 were successful. Is this strong evidence that the new system fails to meet the company's goal?

#### Conditions

##### 1. SRS

1) assumed people are representative

##### 2. $n \geq 30$

2)  $n = 200 \geq 30$

##### 3. $population > 10n$

3) There are more than 2000 cell phone users.

#### Check

$H_0: p = 0.96$

$H_a: p > 0.96$

$\hat{p} = \frac{188}{200} =$

$n = 200$

$\alpha = 0.05$

### Example #2

In a rural area, only about 30% of the wells that are drilled find adequate water at a depth of 100 feet or less. A local man claims to be able to find water by "dowsing"—using a forked stick to indicate where the well should be drilled. You check a SRS of 80 of his customers and find that 27 have wells less than 100 feet deep. What do you conclude about his claim?

#### Conditions

##### 1. SRS

$n = 20$

##### 2. $n > 30$

##### 3. $population > 10n$

#### Check

1) stated in problem

2)  $n = 80 \geq 30$

3) ?

$H_0: p = 0.30$

$H_a: p \neq 0.30$

$\hat{p} = \frac{27}{80}$

$n = 80$

$\alpha = 0.05$

### Example #3

A company with a fleet of 150 cars found that the emissions systems of 7 out of the 22 they tested failed to meet pollution control guidelines. Is this strong evidence that more than 20% of the fleet might be out of compliance?

#### Conditions

##### 1) SRS

#### Check

1) assume 22 cars are representative

##### 2) $n \geq 30$

2) X

##### 3) $pop \geq 10n$

3) X

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check condition

$\hat{p} = \frac{7}{22}$

$H_0: p = 20\%$

$H_a: p > 20\%$

$\alpha = 0.05$

### Examples #4

A magazine is considering the launch of an online edition. The magazine plans to go ahead only if it's convinced that more than 25% of current readers would subscribe. The magazine contacted a simple random sample of 500 current subscribers, and 137 of those surveyed expressed interest. What should the company do?

**Example 5:**

A company is criticized because only 13 of 43 people in executive-level positions are women. The company explains that although this proportion is lower than it might wish, it's not surprising given that only 40% of all its employees are women. What do you think?

**Example 6:**

A random sample of 540 CB South students found that 528 were carrying a cell phone on them. Create and interpret a 95% confidence interval for the proportion of students carrying a cell phone.

**Example 7:** A city ballot includes a local initiative that would legalize gambling. The issue is hotly contested. The local newspaper finds that 53% of 1200 voters that wrote into the newspaper plan to vote "yes." Create a 90% confidence interval for the proportion of voters that will vote "yes" on the gambling issue